

# M16C R8C PC7501 Emulator Debugger V.1.03.00

## Release Notes

This document describes the notes of this debugger, and please read before you start to use this debugger.

And also, please refer to the “High-performance Embedded Workshop Release Notes” about the notes of High-performance Embedded Workshop IDE.

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# 1 Notes

## 1.1 Line Assembly

Regardless of the Radix setting, the default for line assembly input is decimal. Specify H as the radix for a hexadecimal input.

## 1.2 Event Setting

1. TAB order in Set Event Status dialog box  
Even when you press [TAB] key, the next input control may not be focused on the Set Event Status dialog boxes opened from H/W Break, Time Measurement, and Trace Point.
2. In-place-edit mode on event list  
On event list in H/W Break, Time measurement and Trace Point, High-performance Embedded Workshop will not escape from in-place-edit mode even when you press the [ESC] key.
3. Event setting by BIT SYMBOL  
When the specified address is odd numbers, the setting by BIT SYMBOL can not set the correct condition. Use DATA ACCESS setting and specify the compared data with the data mask. For details about how to set the conditions for odd number addresses, refer to the online help.
4. Event detection for BIT SYMBOL  
When the event is set to detect the access to specified bit, it will be detected even if the other bit of the same address as the specified bit is accessed. This is because the access to the bit from MCU is byte access.

## 1.3 Data Trace

1. Split-bar behavior when double-clicking  
If you double-click the split-bar, which divides view up and down, the horizontal scroll-bar, vertical scroll-bar, and tabs in the upper view will vanish. Drag the split-bar to display them again.

## 1.4 Trace

1. Specifying function in SRC mode  
In the SRC mode, when you specify a function to display it, if the current displayed source file includes the function, the top of the source file will be displayed.
2. Saving of tracing result in text  
When you save a tracing result in text with only "BUS" and "DATA" buttons ON, the vertical position of some headers will shifts from the corresponding data. Check "Tab Separated Format" and open it with spreadsheet applications to display them correctly.
3. Loading the trace image file  
Trace window can not load the trace image file saved by PDxx debuggers. And also, trace window can not load the trace image file saved by the different target from the current target.

## 1.5 RAM Monitor

1. Proportional Fonts  
When a proportional font is selected, a part of the characters in the view may be hidden. Fixed fonts are recommended.

## 1.6 Memory

1. 8 bytes data operations  
To set, fill, and copy 8 bytes data are not supported.

## 1.7 Script

1. Result of interactive command  
When you invoke an interactive command, for example, Assemble and setMemoryByte, the running dialog box will appear and may hide the view of the results.
2. SCOPE Command  
When you refer current scope name with SCOPE command after program execution, the scope of the start-up module will be returned even if scope has been changed to the other.

## 1.8 Real-time OS debugging functions

1. When several labels are allocated to the entry address of the tasks or handlers, the task name or the handler name displayed in the windows may be different from the actual function name.
2. When you use the feature to issue system-calls by the script command (MR SYS), the target program should be built with a specific option. For details, refer to the topic "Prepare the real-time OS debug" in the online help.
3. When you use the task pause function, the following code should be inserted to the configuration file of your target program. For details, refer to the user's manual of the real-time OS.

```
// System Definition
system {
    :
    task_pause = yes; // Insert this line
};
```

4. The task pause function uses the address match interrupt of the target MCU. When the target program uses the address match interrupt, or when you use the address match interrupt break function, the task pause function can not be used.
5. When you see the usage of stacks by the script command "MR STK", if the system stack area or each task stack area exceeds the boundary of the coverage bank (256KB boundary), the result will not be displayed.

## 1.9 Macro recording function

The debug windows which support the macro recording function are memory, registers, IO, ASM watch, and C watch. And also, the debug operations which support this are Reset CPU, Go, Reset Go, Go To Cursor, Step In, Step Over, Step Out, Add/Delete break points, Add/Delete address match interrupt break points, and Download the target program.

### 1.10 Test facility function

The contents to be compared by the test facility functions are memory, registers, I/O, Output, stack race, ASM watch, and C watch.

### 1.11 Using cast operators for the member variable

When you use cast operators for the member variable to refer to it as the pointer of the structure, you would not refer to it correctly.

### 1.12 Download module dialog box

This debugger does not support the setting of "Offset", "Memory verify on download", and "Access Size" in the download module setting dialog box. These are always treated as "Offset: 0", "Memory verify: off", and "Access Size: 1".

### 1.13 Real-time execution of the target program

If the following operations are invoked while the target program is running, the real-time execution capability will be lost.

- Dump memory
  - update the display of Memory Window
  - update the display of ASM Watch Window or C Watch Window
  - update the display of Source Window (DIS or MIX mode)
  - display the value of variables in Source Window
- Clear access history in RAM Monitor Window
- Change the ram monitor area in RAM Monitor Window
- Add or remove software break points
- Change the status of hardware break points
- Get the trace information forcibly or re-start recording the trace information in Trace Window

## **1.14 The option “Always treat variables of enumerator type with unknown size as 1 byte”**

The “Always treat variables of enumerator type with unknown size as 1 byte” option is effective after downloading the program. When the option status is changed, target program should be downloaded again.

And also, this option is effective for all variables of enumerator type in the program, even if the compiling options are different for each file.

## **1.15 Debugging for assembler macros**

When the break points are set at the assembler macro codes, the break points would be set at the different address or not be displayed as the PC line.

## **1.16 Debugging for inline functions**

When stepping the function including the call for a inline function, local variables would not be able to be referred.

## **1.17 Automatic target connection on changing the session**

When the target connection is not performed on changing the session, select the menu [Debug] -> [Connect]. To perform automatic target connection, remove the check from the option “Do not perform automatic target connection” in the Option tab on Debug Setting dialog box which is invoked by the menu [Debug] -> [Debug Settings...].

## **1.18 Run program option**

The “Run Program” dialog box enables to specify several temporary PC breakpoints, but this debugger only supports one breakpoint which is listed first in the “Temporary PC breakpoints” list box.

## **1.19 Selection of the object format for download module**

When the specified file format in the debug setting dialog box is different from the format of the object module file, downloading the file may cause a freeze of the debugger. Please select the correct object format. And also, when selecting the object format for download module file, if there are two or more object format, whose name includes the vender name another ones do not include it, prioritize the file whose name includes vender name leading the object format name.

## **1.20 Notes on Debugging (M16C R8C PC7501 Emulator Debugger)**

### **1.20.1 Variables assigned to registers**

When you build a target program, IAR EWM16C may generate the warning like following:

```
Warning [w23]: Cannot represent location of Register pair variable  
'R1H:R1L'
```

In this case, you can not see the variable, which is assigned to R1 in the emulator software. IAR will fix it by upgrading XLINK in near future. Please ask IAR about it for more details.

### **1.20.2 About the self-check function**

In using the self-check function, if you connect the PC7501 emulator with PC via LAN interface, the self-check may fail to diagnose the emulator. When you use the self-check function, please use another communication interface except LAN interface.

### **1.20.3 Display of the cause of last break**

When the target program stops by the access protect function, the cause of the last break, which is displayed in Status Window and Output Window, may not be displayed correctly.

### **1.20.4 Disassembly display in Trace window**

The disassembled instructions may not be displayed correctly in the case blow:

- The operand fetch results are not stored in the trace memory because of the lack of the trace memory.
- Address match interrupt occurred just after the opcode fetch.

#### **1.20.5 The option “Attempt to access memory even in WAIT/STOP mode”**

The option “Attempt to access memory even in WAIT/STOP mode” has been added since the emulator debugger V.1.03. If the option is OFF, the debugger checks whether the status of the connected MCU is HALT. And if the MCU is in HALT status, debugger does not access memory. This behavior will improve the freeze for several seconds because of the memory access to the MCU in HALT status. Instead, it will cause a little overhead to check the status in each memory accesses. Set the check to this option, if the operations slow because of the overhead.

## 2 System Requirements

### 2.1 M16C R8C PC7501 Emulator Debugger

Target host PC	
PC	IBM PC/AT compatible with Pentium III 600MHz or higher
OS	Windows XP Windows 2000
Memory	128MB or more (and in addition, ten or more times as much size as the load module file).
HDD	Hard disk available capacity for installation: 100MB or more. Prepare an area at least double the memory capacity (four-times or more recommended) as the swap area.
Display Resolution	1024 x 768 or higher recommended

Emulator
PC7501

Emulation Probe	MCU file
M3062PT-EPB	M16C62P.MCU
M3062PT2-EPB	M16C62P_512.MCU
M3062PT-EPB + M30262T-PTC	M16C62P.MCU
M3062PT2-EPB + M30262T-PTC	M16C62P_512.MCU
M306N4T-EPB	M16C6N4.MCU
M306NKT-EPB	M16C6NK.MCU
M306V8T-EPB	M16C6V8.MCU
M30260T-EPB-GP (M30290T-EPB + M30260T-48FPD)	M16C26A.MCU
M30263T-EPB-FP (M30290T-EPB + M30263T-42SSB)	M16C26A.MCU
M30290T-EPB-HP (M30290T-EPB + M30290T-80FPD)	M16C28.MCU, M16C29.MCU
M30291T-EPB-HP (M30290T-EPB + M30291T-64FPD)	M16C28.MCU, M16C29.MCU
M3028BT-EPB-1 (M3028BT-EPB + M30263T-42SSB)	M16C26A.MCU
M3028BT-EPB-2 (M3028BT-EPB + M30260T-48FPD)	M16C26A.MCU
M3028BT-EPB-3 (M3028BT-EPB + M30291T-64FPD)	M16C28.MCU, M16C29.MCU
M3028BT-EPB-4 (M3028BT-EPB + M30290T-80FPD)	M16C28.MCU, M16C29.MCU
M3028BT-EPB-5 (M3028BT-EPB + M30280T-85LGF)	M16C28.MCU
R0E521134EPB00 (R0E521000EPB00 + R0E521134CFG00)	R8C/10: R5F21102F.MCU, R5F21103F.MCU R5F21104F.MCU R8C/11: R5F21112F.MCU, R5F21113F.MCU R5F21114F.MCU R8C/12: R5F21122F.MCU, R5F21123F.MCU R5F21124F.MCU R8C/13: R5F21132F.MCU, R5F21133F.MCU R5F21134F.MCU

<p>R0E521174EPB00 (R0E521000EPB00 + R0E521174CSJ00)</p>	<p>R8C/14: R5F21142F.MCU, R5F21143F.MCU R5F21144F.MCU R8C/15: R5F21152F.MCU, R5F21153F.MCU R5F21154F.MCU R8C/16: R5F21162F.MCU, R5F21163F.MCU R5F21164F.MCU R8C/17: R5F21172F.MCU, R5F21173F.MCU R5F21174F.MCU R8C/18: R5F21181F.MCU, R5F21182F.MCU R5F21183F.MCU, R5F21184F.MCU R8C/19: R5F21191F.MCU, R5F21192F.MCU R5F21193F.MCU, R5F21194F.MCU R8C/1A: R5F211A1F.MCU, R5F211A2F.MCU R5F211A3F.MCU, R5F211A4F.MCU R8C/1B: R5F211B1F.MCU, R5F211B2F.MCU R5F211B3F.MCU, R5F211B4F.MCU R8C/28: R5F21282F.MCU, R5F21284F.MCU R8C/29: R5F21292F.MCU, R5F21294F.MCU</p>
<p>R0E521174EPB10 (R0E521000EPB00 + R0E521174CDB00)</p>	<p>R8C/18: R5F21181F.MCU, R5F21182F.MCU R5F21183F.MCU, R5F21184F.MCU R8C/19: R5F21191F.MCU, R5F21192F.MCU R5F21193F.MCU, R5F21194F.MCU R8C/1A: R5F211A1F.MCU, R5F211A2F.MCU R5F211A3F.MCU, R5F211A4F.MCU R8C/1B: R5F211B1F.MCU, R5F211B2F.MCU R5F211B3F.MCU, R5F211B4F.MCU</p>
<p>R0E521237EPB00 (R0E521000EPB00 + R0E521237CFK00)</p>	<p>R8C/20: R5F21206F.MCU, R5F21207F.MCU R5F21208F.MCU, R5F2120AF.MCU R5F2120CF.MCU R8C/21: R5F21216F.MCU, R5F21217F.MCU R5F21218F.MCU, R5F2121AF.MCU R5F2121CF.MCU R8C/22: R5F21226F.MCU, R5F21227F.MCU R5F21228F.MCU, R5F2122AF.MCU R5F2122CF.MCU R8C/23: R5F21236F.MCU, R5F21237F.MCU R5F21238F.MCU, R5F2123AF.MCU R5F2123CF.MCU</p>

R0E521258EPB00 (R0E521000EPB00 + R0E521258CFJ00)	R8C/24: R5F21244F.MCU, R5F21245F.MCU R5F21246F.MCU, R5F21247F.MCU R5F21248F.MCU R8C/25: R5F21254F.MCU, R5F21255F.MCU R5F21256F.MCU, R5F21257F.MCU R5F21258F.MCU
R0E521276EPB00 (R0E521000EPB00 + R0E521276CFG00)	R8C/26: R5F21262F.MCU, R5F21264F.MCU R5F21265F.MCU, R5F21266F.MCU R8C/27: R5F21272F.MCU, R5F21274F.MCU R5F21275F.MCU, R5F21276F.MCU
R0E5212BAEPB00 (R0E521000EPB00 + R0E5212BACFG00)	R8C/2A: R5F212A7F.MCU, R5F212A8F.MCU R5F212AAF.MCU, R5F212ACF.MCU R8C/2B: R5F212B7F.MCU, R5F212B8F.MCU R5F212BAF.MCU, R5F212BCF.MCU
R0E5212BAEPB10 (R0E521000EPB00 + R0E5212BACFK00)	R8C/2A: R5F212A7F.MCU, R5F212A8F.MCU R5F212AAF.MCU, R5F212ACF.MCU R8C/2B: R5F212B7F.MCU, R5F212B8F.MCU R5F212BAF.MCU, R5F212BCF.MCU
R0E5212DAEPB00 (R0E521000EPB00 + R0E5212DACFK00)	R8C/2C: R5F212C7F.MCU, R5F212C8F.MCU R5F212CAF.MCU, R5F212CCF.MCU R8C/2D: R5F212D7F.MCU, R5F212D8F.MCU R5F212DAF.MCU, R5F212DCF.MCU



## 3 Version Report

This section describes the specification of the changed software.

### 3.1 M16C R8C PC7501 Emulator Debugger V.1.03.00

In this version, the following specifications were changed from the previous version M16C R8C PC7501 Emulator Debugger V.1.02.00.

This version supports all of the function extensions and the revisions to the restrictions in the High-performance Embedded Workshop V.4.02.00 and V.4.03.00. For more details, please refer to the RENESAS TOOL NEWS “061216/tn2” issued on December 16, 2006 and “070701/tn1” issued on September 1<sup>st</sup>, 2007.

#### 3.1.1 Revisions to Restrictions

1. A limitation has been corrected: if the On Demand check box is checked in the Debugging Information tab of the Init dialog box, which appears when you invoke your debugger, target programs may not be loaded successfully on MCUs and not run properly. (For more details, refer to the RENESAS TOOL NEWS “070416/tn8” issued on April 16, 2007).
2. A limitation has been corrected: If the size of the variable to be referred by the quick watch feature is larger than 256 bytes, High-performance Embedded Workshop would crash. (For more details, refer to the RENESAS TOOL NEWS “070601/tn5” issued on June 1<sup>st</sup>, 2007).

#### 3.1.2 Functional Extensions and Modifications

1. Displaying source files information automatically in the Workspace Window. When a download module file is downloaded, the High-performance Embedded Workshop obtains source files information contained in the download module file through its debug information, and displays it under "download module" node in the Projects tab on the Workspace Window. Note that this function is available only for debugging the debug-only projects.
2. Supports C watch window included in High-performance Embedded Workshop V.4.03. The feature Changing scope of the variable and suppression leading zero are supported.
3. The option to specify the size (1byte or 2byte) of enumerator type is added.
4. Supports “Disconnect target” feature.
5. When the instruction is modified by the line assemble feature, if the old instruction length is longer than the new instruction length, NOP instructions are inserted automatically so as to suit the old instruction length.
6. The instruction format specifier is displayed for each instruction in disassembly. And also, can be switched not to display.
7. Supports to substitute the bit field member variable.
8. The default value of “Reset CPU after download module” is changed to be checked.
9. The option not to access memory while CPU is wait/stop mode is added.
10. These commands, which can be invoked in Command Line, have been supported:  
addressinterruptbreak\_display, addressinterruptbreak\_set, addressinterruptbreak\_clear,  
addressinterruptbreak\_enable,

### 3.2 M16C R8C PC7501 Emulator Debugger V.1.02.00

In this version, the following specifications were changed from the previous version M16C R8C PC7501 Emulator Debugger V.1.01.00.

This version supports all of the function extensions and the revisions to the restrictions in the High-performance Embedded Workshop V.4.01.00 and V.4.01.01. For more details, please refer to RENESAS TOOL NEWS “060701/tn1” issued on July 1, 2006 and “060801/tn1” issued on August 1, 2006.

#### 3.2.1 Revisions to Restrictions

1. A limitation has been corrected: The unexpected result will be caused when the object module files, which are created using tool chains manufactured by IAR Systems inc., and which are created with the “Fill unused code memory” link option, are loaded.  
For more details, refer to the RENESAS TOOL NEWS RSO-DebuggerPackage\_1-051016D issued

on October 16, 2005.

2. A limitation has been corrected: The structure member variables, union member variables, or class member variables whose name begins with a letter of 'e' or 'E' immediately followed by a numeral, are not referenced.  
For more details, refer to the RENESAS TOOL NEWS RSO-M3T-PD32RM-060116D issued on January 16, 2006.
3. A limitation has been corrected: An area accessed through the debugger will affect the result of the coverage measurement even if the area is not accessed by the target program.  
For more details, refer to the RENESAS TOOL NEWS RSO-PC7501-060216D issued on February 16, 2006.

### **3.2.2 Functional Extensions and Modifications**

1. The real-time OS, M3T-MR30/4 which is compliant to  $\mu$ ITRON 4.0 specifications, has been supported.
2. The ELF/DWARF2 format files generated using KPIT GNUM16C have been supported.
3. The device depended files like MCU files or IO files for R8C/Tiny group have been added.
4. These commands, which can be invoked in Command Line, have been supported:  
breakpoint, breakpoint\_disable, breakpoint\_display, breakpoint\_clear  
register\_display, register\_set  
disassemble, assemble
5. To display the progress for starting up has been supported.

## **3.3 M16C R8C PC7501 Emulator Debugger V.1.01.00**

In this version, the following specifications were changed from the previous version M16C R8C PC7501 Emulator Debugger V.1.00.01.

This version supports all of the function extensions and the revisions to the restrictions in the High-performance Embedded Workshop V.4.00.02. For more details, please refer to RENESAS TOOL NEWS RSO-HEW\_1-050701D issued on July 1, 2005.

### **3.3.1 Revisions to Restrictions**

1. A limitation has been corrected: To keep quickly pushing the step button on the toolbar switches the source mode of the source window into the disassembly mode.
2. Trace window may not read trace memory image files which was saved in the Trace window.

### **3.3.2 Functional Extensions**

1. The following windows for the real-time OS debugging are added to this version.
  - (a) MR Window
  - (b) MR Trace Window
  - (c) MR Analyze Window
  - (d) MR Task Pause Window
  - (e) Task Trace Window
  - (f) Task Analyze Window

## **3.4 M16C R8C PC7501 Emulator Debugger V.1.00.01**

In this version, the following specifications were changed from the previous version M16C R8C PC7501 Emulator Debugger V.1.00.00.

### **3.4.1 Revisions to Restrictions**

1. A limitation has been corrected: The automatic backup function of workspaces does not operate properly.  
For more details, please refer to RENESAS TOOL NEWS RSO-HEW\_1-050216D issued on February 16, 2005.
2. A limitation has been corrected: When connecting with emulator PC7501 or compact emulator in a debugging session of them, High-performance Embedded Workshop might load break points

using address match interrupt that are deleted before.

3. A limitation has been corrected: When a setting of RAM monitoring area is changed with RAM Monitor Area Setting window, the setting displayed on-screen may not match with the actual ones, resulting in improper operation.

For more details, refer to RENESAS TOOL NEWS RSO-M3T-PD308MF-050216D issued on February 16, 2005.

4. A limitation has been corrected: If any of the following operations is performed with the C Watch window being undocked, the High-performance Embedded Workshop abnormally shut down.
  - (a) Switching between sessions
  - (b) Closing a workspace
  - (c) Terminating an application program

For more details, please refer to RENESAS TOOL NEWS RSO-HEW\_2-050301D issued on March 1, 2005.

5. A limitation has been corrected: C watch window may not load correct variable names which are registered in the watch tab.

This problem occurs if a variable name is entered in any of the following ways:

- (a) An element of an array is specified using [ ] operator.  
Example: a[0]
- (b) A member of a structure or union is specified using . operator.  
Example: str.a
- (c) The destination of a pointer is pointed to using -> operator.  
Example: pstr->a
- (d) An Address or indirection operator (& or \*) is used.  
Example: &a or \*a

For more details, please refer to RENESAS TOOL NEWS RSO-HEW\_3-050301D issued on March 1, 2005.

6. A limitation has been corrected: The drag and drop operation in memory window may cause the general protection failure.

### 3.4.2 Functional Extensions

1. Script window is modified to be able to change the display font.
2. The menu to open the online help for the emulator is added.